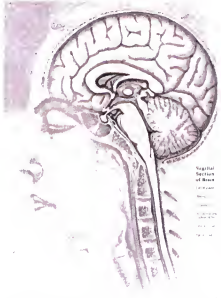
OBSTRUCTIVE SLEEP APNEA

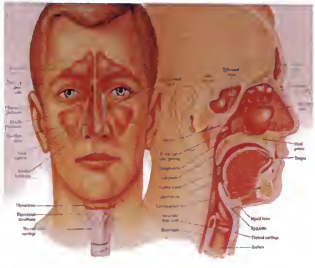
What is obstructive sleep apnea?

Sleep apnea is a common disorder that can cause very serious health problems. When you are awake, breathing occurs automatically. You don't have to think about it. This occurs despite the fact that breathing is an amazingly complex process.



While you are awake, the brain actively stimulates the muscles in your upper airway, or throat. This causes the muscles to slightly contract. By increasing the muscle tone in the throat, your brain is actually holding the upper part of your airway open so that you can breathe. This process enables you to move air in and out of your lungs through an open throat as you go about your usual daily activities. Whether you're sitting quietly or running a marathon, your brain is constantly making adjustments in the rate and depth of each breath as the air moves in and out of your body. Simultaneously, muscle contractions alter the level of "openness" of your throat. This intricate process, controlled entirely by your brain, allows your airflow to be modified according to your body's oxygen and carbon dioxide requirements.

However, when you fall asleep.....the situation changes. When the sleep centers deep within the brain "turn on" at the start of your sleep, your brain essentially stops stimulating the muscles in your throat, or upper airway. The various muscles stop contracting and the tissues relax. This causes the airspace behind your palate and your tongue to get smaller. In some people, when they fall asleep and the muscles of the upper airway relax, the airway will essentially become too small. When this happens the body loses its ability to breathe properly. Essentially, the body becomes strangled or suffocated from the inside. It is like going snorkeling with a snorkel that has a partial or complete blockage in the middle of the tube. It is simply impossible to get enough airflow through the device. In that situation, it's not only impossible to get enough air to meet the body's constant demand for oxygen, but with airway collapse these individuals aren't



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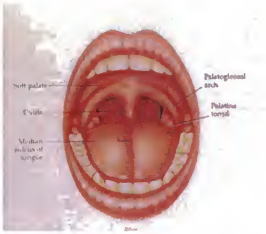
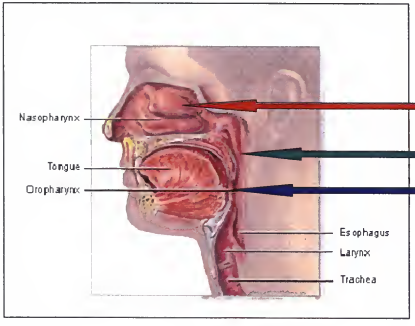
able to get rid of, or eliminate, carbon dioxide.



It is not unusual for people with obstructive sleep apnea to stop breathing for 10 to 30 seconds at a time while they are sleeping. During these episodes, when the body stops breathing, several important things happen; oxygen levels decrease, carbon dioxide levels increase, the heart dramatically increases its work, blood pressure goes up, the adrenal glands release excess hormones, and then finally the brain will essentially pull out of sleep, or arouse, for a brief period. When the brain arouses a surge of nerve discharge occurs, the muscles in the upper airway are instantaneously stimulated to contract. This forces the airway open so that a breath can be taken. This is often, but not always, accompanied by a snore. In the large majority of cases, people with obstructive sleep apnea are completely unaware that this is happening to them during their sleep. They usually have no recollection of any abnormal breathing patterns at night, and may even be unaware of the fact that they snore. These breathing abnormalities can happen hundreds of times every night. Most of the time people do not remember these brain arousals when they wake up to start their day. There are occasions however, when the pause in breathing is so severe, and the brain arousal it causes is so strong that it will abruptly awaken the person to the point that he or she is fully aware and will remember being awake. The person may then go back to sleep, or might have significant difficulties returning to sleep. Importantly, regardless of whether or not a person actually remembers waking up during the night, sleep apnea prevents the brain from completing the normal and required process of cycling through the very complex stages of sleep.



Common Sites of Airway Obstruction

Nose and Nasal Passages

Behind the Palate

Behind the Tongue

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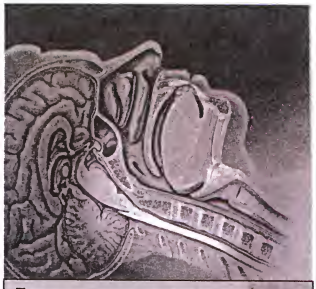
Table 1: Conditions That Can Make Obstructive Sleep Apnea Worse
Nasal allergies, congestion, or blockage
Difficulty breathing through your nostrils
Tonsil enlargement
Large tongue
Small jaw
Overbite
Obesity
Alcohol ingestion
Sleep aid medications
Pain medications
Sleeping on your back



***THE UPPER AIRWAY DURING SLEEP*: NOTICE THE TONGUE CROWDING THE AIRWAY**

Are there any conditions that can make obstructive sleep apnea worse?

Yes. Any condition that alters the anatomy of your upper airway in such a way that it causes the space that is supposed to be open for airflow to be smaller will function to make obstructive sleep apnea worse (**Table 1**). Some of these conditions are treatable with medications or lifestyle modifications. Others may be amenable to surgery.

How will I feel if I have obstructive sleep apnea?

Even if you don't remember waking up during the night, you may notice some degree of daytime sleepiness. You may have the urge to fall asleep or doze while at work or at home, while you are sitting quietly, or while you are driving. You may notice that small or trivial matters seem to cause abnormal levels of irritation or anxiety. You may feel run down, fatigued, or lethargic. You may also experience night-time and/or morning headaches, migraines, memory problems, mood changes, feelings of depression, and/or a decreased interest in sex. Further, you or your bed partner might notice that you are snoring, mouth breathing, making significant efforts to breathe, or that your breathing seems to pause during sleep. Further, your sleep may be restless or fragmented. A more complete listing of the signs and symptoms of obstructive sleep apnea are included in ***Table 2***. Children with obstructive sleep apnea may have issues related to snoring (which is never normal in a child), or problems with bed-wetting. Many children with obstructive sleep apnea have problems with daytime behavior problems, attention deficit disorder, attention deficit hyperactivity disorder, and/or learning problems.

Table 2: Signs and Symptoms of Obstructive Sleep Apnea	
Snoring	Limb movements during sleep
Sleep that doesn't restore wakefulness	Insomnia
Excessive daytime sleepiness	Abnormal movements or activity at night
Fatigue, lethargy, tiredness	Sweating during sleep
Choking or gasping episodes at night	Memory problems
Witnessed breathing pauses during sleep	Irritability
Teeth Grinding	Anxiety
Headaches or migraines	Depression
Sore throat, dry mouth, thirst at night	Aggression or hostility
Heartburn or reflux symptoms	Marital difficulties and divorce
Difficulty swallowing	Sexual dysfunction
Urinating at night	Decreased libido
Sleep fragmentation	Chest pain
Peripheral edema	Difficulty staying awake while driving

How serious is obstructive sleep apnea?

Obstructive apnea is a very serious medical condition. The severity of this disorder goes far beyond simply making you feel tired or sleepy during the day. As previously described, this disorder not only has the potential to result in disrupted sleep and daytime fatigue, but it also seriously compromises your body's ability to regulate its oxygen and carbon dioxide levels. This has very dangerous effects that have been proven to negatively alter the function of your major organ systems. Studies have shown that the abnormal interruptions in breathing actually have negative effects that function to alter the function of the cells of your body. The primary areas of your body that are repeatedly hurt by these breathing obstructions are your brain, your heart, your hormonal systems, and your blood vessels. The medical conditions associated with obstructive sleep apnea are listed in **Table 3**.

Table 3: Obstructive Sleep Apnea is associated with:
High blood pressure
Heart disease
Heart attacks
Congestive Heart Failure
Hardening of the arteries
Stroke
Daytime sleepiness
Decreased mental function and memory
Motor-vehicle and job-related accidents
Diminished quality of life
Diabetes and Insulin Resistance
Obesity and difficulty losing weight
Depression and anxiety disorder
Increased inflammation
Increased blood clots
Increased risk of hospitalization
Shorter lifespan

The bottom line is that we know untreated obstructive sleep apnea will result in a <u>shorter lifespan</u> and a <u>decreased quality of life</u>.

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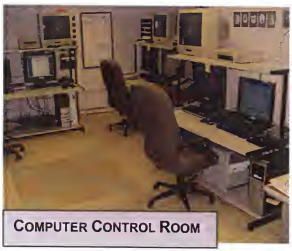
How do I know if I have sleep apnea?

Because some of the symptoms of sleep apnea occur while you're sleeping, your bed partner may notice it first. Heavy snoring or long pauses in your breathing during sleep are the most obvious symptoms. However, not everyone with sleep apnea snores during sleep. You may have sleep apnea even if there is no history of snoring. The standard-of-care and the most thoroughly tested method of evaluating obstructive sleep apnea is an overnight sleep study performed in an accredited sleep center. This is called a *sleep study*, or *polysomnogram*. It is a noninvasive test (i.e. no needles and usually no shaving is required). Sensors are placed on your skin by a sleep technician in order to monitor brain waves, eye movements, heart activity, breathing movements, airflow, snoring, oxygen levels, and leg muscle movements during sleep. The sleep technician is available throughout the night to attend to your needs. The technicians spend the night in a computer control room where they closely monitor the computers that analyze each aspect of your sleep. The rooms are private, usually have a bathroom/shower, and are designed to be as comfortable as possible. You will be able to get up to use the bathroom during the night as needed. This is considered outpatient medical testing. Therefore, nurses are not available. If a caregiver is usually required for you at your home, we ask that your caregiver spend the night at the sleep center with you, in order to attend to your usual needs. If you are using supplemental oxygen at home, your study may or may not be started with supplemental oxygen. This is determined by the doctor prior to the test. The decision is based on the doctor's clinical assessment of your medical condition and determination of what treatments may be required to help you.

STANDARD ROOM USED FOR AN OVERNIGHT SLEEP STUDY



COMPUTER CONTROL ROOM

What happens behind the scenes?

Once your sleep study is completed, the sleep center's work is just beginning. A highly trained technician specializing in sleep disorders will analyze and review all the information from every second of your overnight recording. This person's work is then compiled into a *raw data* report. The physician then reviews all the information, reviews your recordings in great detail, and interprets your study to determine if you have a sleep disorder. Then the physician creates a formal report that includes your diagnosis and treatment plans.

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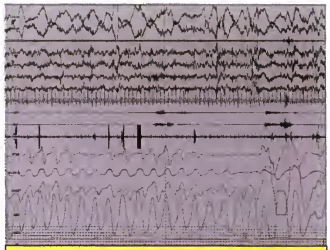

SAMPLE 60 SECOND RECORDING OBTAINED DURING AN OVERNIGHT SLEEP STUDY: [THIS PERSON HAS OBSTRUCTIVE SLEEP APNEA]

Is there anything I can do to help my sleep apnea?

Yes. The following steps help many people who have sleep apnea sleep better:

- Stop all use of alcohol or sleep medicines. These relax the muscles in the back of your throat, making it more difficult for you to breathe during sleep.
- If you smoke….quit smoking.
- If you are overweight, make great efforts to lose weight.
- Sleep on your side instead of on your back.
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What are the treatments for obstructive sleep apnea?

Just like with most other medical disorders, there are occasions when people with obstructive sleep apnea require a combination of treatments in order to adequately address their disorder. The treatments are divided into three broad categories: medical, surgical, and dental. The goal of each type of treatment is the same; keep and maintain the airway open when you sleep in such a way that your breathing is normalized. There are *NO* medications available to treat obstructive sleep apnea.

The medical approach to treating sleep apnea is to use a continuous positive airway pressure (CPAP) device. A CPAP unit is a device that varies in size from a small- to a large shoe-box. It has a mask, tubes, a fan, and a computerized compressor. It uses air pressure to keep the tissues in your throat open when the muscles in your upper airway are relaxed during sleep. It works very similar in principle to blowing up a balloon. Essentially, it inflates the upper airway and throat, preventing the tissues from collapsing shut while you sleep. This allows air you need to easily pass through your upper airway with each breath. Used properly whenever you sleep, it will eliminate snoring and will continuously keep the airway open, allowing your brain to cycle normally through the various stages of sleep.

EXAMPLES OF THE VARIOUS MASKS THAT ARE USED WITH THE CPAP DEVICE

The surgical approach to obstructive sleep apnea includes a variety of techniques that are designed to remove tissues from the nasal passages and throat. This might include removal of the tonsils and adenoids, straightening of a crooked nose, opening up the nasal and sinus

passages, removal of the uvula and part of the soft palate, or a variety of procedures designed to bring the tongue forward, away from the back of the throat. The most aggressive approach, performed only under very rare and extreme circumstances, is a tracheotomy.

The dental approach to the treatment of obstructive sleep apnea, an approach that is used under certain circumstances, is to fashion a custom device that is very similar to a bite-guard. The difference is that the jaw, or lower teeth, is pulled forward relative to the upper teeth. As the tongue is actually attached to the inner side of the jaw, right below the lower teeth, pulling the jaw forward will serve to pull the tongue away from the back of the throat. Worn during sleep, this will help improve airflow behind the tongue

SAMPLE 60 SECOND RECORDING OBTAINED DURING AN OVERNIGHT SLEEP STUDY:
[THIS PERSON'S OBSTRUCTIVE SLEEP APNEA IS BEING TREATED WITH A CPAP DEVICE]

Where is my sleep study to be performed?

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www.compsleep.com (for more information and patient forms)

Will addressing this problem change my life?

Obstructive sleep apnea has probably already affected you more than you know. Chances are that things will improve for you, and possibly your bed partner, once the diagnosis is made and you start treatment. Whatever your treatment, remember that you are not alone and help is available. Please return to our sleep center should you have any questions or concerns regarding your sleep related issues.

PLEASE DON'T DRIVE OR OPERATE MACHINERY WHEN YOU ARE FATIGUED. YOU ARE MORE LIKELY TO BE INVOLVED IN AN ACCIDENT AND DRIVING WHILE SLEEPY PLACES YOU AND OTHERS AT AN INCREASED RISK OF INJURY OR DEATH.

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